





*Environment topics at a glance**3699E*

## Fine particles

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### What are fine particles?

**F**ine particles in the atmosphere are composed of sulphates, nitrates, ammonium salts, organic compounds, soot, metals and soil dust, singly or in combination. They may be found in the form of smoke, fume, dust, fly ash (from burning powdered coal) and pollen.

When fine particles get into the air they can be carried great distances by winds. Particles 10 microns (micrometres) in diameter or smaller are easily inhaled. These are called inhalable particles ( $PM_{10}$ ). If they are less than 2.5 microns in diameter they can penetrate deeply into the lungs.

These respirable particles ( $PM_{2.5}$ ) are emitted by diesel and gasoline engines, power plants, industrial plants and waste incinerators. Diesel engines are a particular problem as they emit up to 100 times more fine particles than do gasoline-powered engines. Construction and mining operations, wood burning and road and dust soil are other sources.

Respirable particles are also formed in the atmosphere from the chemical reactions of gaseous pollutants.

We have a good idea what kinds of activities produce fine particles. But in order to come up with a reduction strategy we need more precise data on the levels from different sources and the processes by which they are formed in the atmosphere.

### Why are we concerned about particles?

Particles in the atmosphere affect visibility. They also soil and damage materials. The acid constituents eat away at limestone and

marble in buildings and other structures. However, while particles cause serious property damage, it's their health effects that concern us the most.

Studies carried out since the early 1990s link high levels of fine particles with increases in hospital admissions and deaths.

Children, elderly people and people who have asthma, respiratory problems or heart disease are most susceptible to fine particles. A 1992 study found that the lung capacity of children is temporarily reduced on days when particle levels are high. Children with asthma and respiratory problems are affected even at low levels.

### How do we measure particles?

Because of concerns about health effects, the Ministry of the Environment has been monitoring fine particles for a number of years. Fine particles are now monitored at 23 stations across the province using a filter-based method that makes it possible to determine their chemical composition.

A number of these stations also have state-of-the art equipment that monitors particles continuously, producing hourly readings.

### Where are particle levels the highest?

The industrial areas of the province experience the highest levels of particles. Between 1991 and 1996 (the last year for which we have monitoring statistics), Windsor and Hamilton had the most days when levels of inhalable particles went above the ministry's interim air quality criterion.

# Green Facts

## What are we doing?

Levels of total suspended particles, including particles larger than 10 microns, have declined by 54 per cent in Ontario since 1974. However, between 1991 and 1996, every monitoring site in the province reported at least one exceedance of the interim criterion for fine particles.

The province is committed to substantially reducing this harmful pollutant.

- ❖ In November 1997, the Ontario environment ministry introduced an interim air quality criterion for inhalable particles of 50 micrograms per cubic metre of air during a 24-hour period. This limit has also been adopted as a standard in British Columbia and Newfoundland, California, the United Kingdom and Australia.
- ❖ A committee representing the federal and provincial governments is expected to recommend Canada-wide standards for fine particles and ground-level ozone in 1999.
- ❖ Ontario's Smog Plan calls for a strategy to reduce fine particles by the end of 1998. The 48 participating organizations are aiming for a 45 per cent reduction in emissions of nitrous oxides and volatile organic compounds by 2015. These pollutants contribute to the formation of both ozone and fine particles.
- ❖ In 1997 the province announced its Drive Clean program, which will require regular emissions testing for cars, trucks and buses. Vehicles that fail the tests will have to be repaired. When the program is in effect province-wide it will reduce emissions of particles by an estimated 220 tonnes annually.

## For more information on fine particles and other topics, please contact:

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